

REMARKS

Foreign Priority

The acknowledgement, in the Office Action, of a claim for foreign priority under 35 U.S.C. § 119(a)-(d), and that the certified copies of the priority documents have been received, is noted with appreciation.

Status Of Application

Claims 1-31 are pending in the application; the status of the claims is as follows:

Claim 29 is objected to because of informalities.

Claim 1, 4-6, 9-12 and 28-30 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,790,311 to Togino (hereinafter the “Togino Patent”).

Claims 13, 16, and 26 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,377,409 to Kanai (hereinafter the “Kanai Patent”).

Claim 31 is rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,166,834 to Taketomi et al. (hereinafter the “Taketomi Patent”).

Claims 2 and 3 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Togino Patent, in view of U.S. Patent No. 6,122,080 to Ogata (hereinafter the “Ogata Patent”).

Claims 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Togino Patent, in view of U.S. Patent No. 6,049,429 to Iizuka et al. (hereinafter the “Iizuka Patent”).

Claims 14, 15, 17-25 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Specification

The indication, in the Office Action, that the specification filed on March 8, 2001, is objected to by the Examiner, is noted. This objection was based upon the specification failing to describe the optical element comprising a two hologram surface formed of reflection type holograms as recited in claim 31. As claim 31 has been cancelled by this amendment, this objection has been rendered moot.

Drawings

The indication, in the Office Action, that the drawings filed on March 8, 2001, are objected to by the Examiner, is noted. This objection was based upon the drawings failing to show the optical element comprising a two hologram surface formed of reflection type holograms as recited in claim 31. As claim 31 has been cancelled by this amendment, this objection has been rendered moot.

Claim Amendments

Claims 1 and 28 have been amended to more accurately describe the hologram surface as being a plane. Support for these amendments are found in Tables 1-6 that each show r3 (the hologram surface) to have an infinite radius of curvature, i.e., the hologram surface is plane. Claim 16 is amended to include a period at the end of the claim. Claim 29 is amended to correct an antecedent basis error in that the third reflecting surface is the hologram surface. These changes do not introduce any new matter.

Allowable Subject Matter

The objection to claims 14, 15, 17-25, and 27 as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, is noted with appreciation.

Claims 14, 15, 17-25, and 27 depend either directly or indirectly from independent claim 13. As claim 13 is believed to be allowable as discussed below, claims 14, 15, 17-25, and 27 are likewise considered to be allowable.

Accordingly, it is respectfully requested that the objection to claims 14, 15, 17-25, and 27 as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, be reconsidered and withdrawn.

35 U.S.C. § 102(b) and (e) Rejections

The rejection of claims 1, 4-6, 9-12, and 28-30 under 35 U.S.C. § 102(b) as being anticipated by the Togino Patent, is respectfully traversed based on the following.

Amended claim 1 recites in relevant part:

a prism having at least two reflecting surfaces arranged in facing each other, and a plane hologram surface formed of a reflection-type hologram, and at least one of the two reflecting surfaces arranged in facing each other is a light-beam-selective surface which selectively transmits or reflects light,

(Emphasis added.) Amended claim 1 thus includes the limitation of a plane hologram surface. That the hologram surface is a plane (or planar) can readily be ascertained in

Tables 1-6 of the present specification. In each Table, r3, corresponding to the hologram surface, has an infinite radius of curvature, i.e., the hologram surface is a plane.

In contrast, the Togino Patent does not disclose or suggest a plane hologram surface. As seen in the tables for Examples 1-3, surface 5, which generally corresponds to r3 of the present application (the hologram surface), has a finite radius of curvature in both the X and Y directions. By having finite radius of curvatures, surface 5 is not a plane surface. Furthermore, the Togino Patent teaches away from surface 5 being a plane surface. As found in column 4, lines 50-56, the Togino Patent teaches the preferability of a positive/negative/positive/negative/positive power configuration to correct for coma, field curvature and other aberrations. This configuration is not possible with the prism as disclosed in the Togino Patent unless surface 5 is not a plane surface. Therefore, as the Togino Patent does not disclose or suggest the use of a plane surface, the Togino Patent cannot anticipate or render obvious the invention of claim 1, which includes the limitation of a plane hologram surface.

Claims 4-6 and 9-12 depend, either directly or indirectly, from claim 1. As claim 1 is considered unanticipated by the Togino Patent, claims 4-6 and 9-12 are likewise considered unanticipated and non-obvious for at least the same reasons.

Amended claim 28 likewise includes the more specific limitation of a plane hologram surface. As noted above, the Togino Patent does not disclose or suggest a plane hologram surface. In fact, the Togino Patent discloses only a curved surface. Therefore the Togino Patent cannot anticipate or render obvious the invention of claim 28.

Claims 29 and 30 depend from claim 28. As claim 28 is considered unanticipated by the Togino Patent, claims 29 and 30 are likewise considered unanticipated and non-obvious for at least the same reasons.

Accordingly, it is respectfully requested that the rejection of claims 1, 4-6, 9-12, and 28-30 under 35 U.S.C. § 102(b) as being anticipated by the Togino Patent, be reconsidered and withdrawn.

The rejection of claims 13, 16, and 26 under 35 U.S.C. § 102(e) as being anticipated by the Kanai Patent, is respectfully traversed based on the following.

Claim 13 recites in relevant part:

wherein an image light beam corresponding to the information of the first image exiting from the first image display member is reflected between the two reflecting surfaces of the first prism arranged in facing each other, and is reflected on another reflecting surface of the first prism, and then, after being transmitted through the light-beam-selective surface, is directed to an observer's pupil, on the other hand, an image light beam corresponding to the information of the second image exiting from the second image display member is reflected between the two reflecting surfaces of the second prism arranged in facing each other, and is reflected on another reflecting surface, and then is, after being transmitted through the light-beam-selective surface, directed to the same observer's pupil as the light beam of the first image

(Emphasis added.) Claim 13 thus includes the limitation that both generated images are directed to the same pupil, i.e., the word "same" in "same observer's pupil" corresponds to pupil, not observer. That only a single pupil is intended can readily be seen in the embodiments illustrated in Figures 14-20, 23 and 24 of the present application. In each of these Figures, generated image light beams from both the top and bottom image display elements 3 are coincident on the same pupil 2.

In contrast, the optical viewing system disclosed in the Kanai Patent does not provide two images to the same observer's pupil. This is clearly illustrated in Figures 3A and 3B of the Kanai Patent in which parallel, but separate, optical trains are used for the right and left eyes. Therefore, as the Kanai Patent does not disclose or suggest two images directed to the same observer's pupil, the Kanai Patent cannot anticipate or render obvious the invention of claim 13, which includes the limitation of two images directed to the same observer's pupil.

Claims 16 and 26 depend from claim 13. As claim 13 is considered unanticipated by the Kanai Patent, claims 16 and 26 are likewise considered unanticipated and non-obvious for at least the same reasons.

Accordingly, it is respectfully requested that the rejection of claims 13, 16, and 26 under 35 U.S.C. § 102(e) as being anticipated by the Kanai Patent, be reconsidered and withdrawn.

The rejection of claim 31 under 35 U.S.C. § 102(e) as being anticipated by the Taketomi Patent is rendered moot by the cancellation of claim 31.

35 U.S.C. § 103(a) Rejections

The rejection of claims 2 and 3 under 35 U.S.C. § 103(a), as being unpatentable over the Togino Patent, in view of the Ogata Patent, is respectfully traversed based on the following.

Claims 2 and 3 depend from claim 1. As claim 1 is considered unanticipated by the Togino Patent, claims 2 and 3 are likewise considered unanticipated for at least the same reasons. Further, the addition of the Ogata Patent does not render the invention of claims 2 and 3 obvious. While the Ogata Patent appears to disclose a plane reflection-type hologram, there is no suggestion to combine such a plane reflection-type hologram with the curved surface 5 disclosed in the Togino Patent. The Examiner bears the initial burden

of factually supporting a *prima facie* case that provides some suggestion or motivation to combine a plane reflection-type hologram with a curved, reflecting surface as part of a positive/negative/positive/negative/positive optical system with a reasonable expectation of success.¹ The Examiner has provided no factual support for combining a plane reflection-type hologram with a curved reflecting surface. Therefore, the Examiner has impermissibly combined the Togino and Ogata Patents in an effort to render claims 2 and 3 obvious. Similarly, the impermissible combination of the Togino and Ogata Patents cannot anticipate or render obvious claim 1, from which claims 2 and 3 depend.

Accordingly, it is respectfully requested that the rejection of claims 2 and 3 under 35 U.S.C. § 103(a) as being unpatentable over the Togino Patent, in view of the Ogata Patent, be reconsidered and withdrawn.

The rejection of claims 7 and 8 under 35 U.S.C. § 103(a), as being unpatentable over the Togino Patent, in view of the Iizuka Patent, is respectfully traversed based on the following.

Claims 7 and 8 depend from claim 1. As claim 1 is considered unanticipated by the Togino Patent, claims 7 and 8 are likewise considered unanticipated for at least the same reasons. Further, the addition of the Iizuka Patent does not render the invention of claims 7 and 8 obvious. While the Iizuka Patent appears to disclose a second prism element 11 that may serve as a deflection correction member, the second prism element clearly has a radius of curvature. As seen in Figures 2, 4, 7, and 9, the second prism 11 element has a well-defined radius of curvature. Therefore, while a second prism element with a well defined radius of curvature may work well with the finite radius of curvature surface 5 of the Togino Patent, such a combination does not disclose or suggest a plane hologram surface, a limitation of claim 1. As the combination of the Togino and Iizuka Patents does not render obvious all of the limitations of claim 1, the Togino and Iizuka

¹ MPEP § 2143.

Patents cannot render obvious claims 7 and 8 that depend therefrom for at least the same reasons.

Accordingly, it is respectfully requested that the rejection of claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over the Togino Patent, in view of the Iizuka Patent, be reconsidered and withdrawn.

New Claim

Claim 32 is a new claim presented by this amendment. New claim 32 is directed to an optical element rather than an information display device. Claim 32 is directed to an optical element allowing the coincident display of two images upon an observer's pupil. Figures 17 and 18, corresponding to the eleventh and twelfth embodiments of the present specification, are two possible embodiments of claim 32. As such, claim 32 is thus disclosed and illustrated within the present specification and drawings. As noted above, neither the Togino Patent, the Kanai Patent, the Taketomi Patent, the Ogata Patent, the Iizuka Patent, nor any combination thereof discloses or renders obvious a plane hologram surface in the given configuration providing for forming two images on an observer's pupil. Claim 32 is therefore considered unanticipated and non-obvious over the Examiner cited references and is thus considered allowable.

CONCLUSION

Wherefore, in view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment does not increase the number of independent claims (one independent claim is cancelled and one is added), does not increase the total number of claims, and does not present any multiple dependency claims. Accordingly, no fee based on the number or type of claims is currently due. However, if a fee, other than the issue

Serial No. 09/801,405

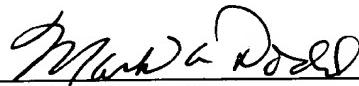
fee, is due, please charge this fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.

Any fee required by this document other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

By: 
Mark A. Dodd
Reg. No. 45,729
Agent for Applicants

MAD:jkk
SIDLEY AUSTIN BROWN & WOOD LLP
717 N. Harwood, Suite 3400
Dallas, Texas 75201
Direct: (214) 981-3481
Main: (214) 981-3300
Facsimile: (214) 981-3400
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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The following is a marked-up version of the changes to the specification and claims which are being made in the attached response to the Office Action dated August 14, 2002.

IN THE SPECIFICATION:

The paragraph beginning at page 14, line 6, and ending at page 14, line 12:

Another construction of the information display device employed in the present invention includes two image display elements, and, by using the eyepiece optical systems corresponding to the individual image display elements, it makes a light beam emitted from [the] each image display element enter one pupil. The individual image display [elemtns] elements and eyepiece optical systems correspond to the different display areas, respectively, and by observing with putting these display areas together, [it designs to widen] the design widens the angle of view (angle of visibility of displayed image), while realizing a thin and compact structure.

The paragraph beginning at page 17, line 5, and ending at page 17, line 14:

Fig. 6 is a diagram schematically illustrating the outline of the construction of an optical system forming a hologram (hereinafter, such an optical system is referred to as a “manufacturing optical system”). In the information display device of the present invention, a hologram lens is obliquely arranged relative to a light beam of the displayed image and has optical power as an eyepiece optical system, and therefore it forms a [nonaxisymmetric] nonaxisymmetric optical system. When this [nonaxisymmetric] nonaxisymmetric optical system performs only the same function as that of a centered lens, asymmetrical distortion (trapezoid distortion) caused by decentering or curvature of

image surface occurs. In order to prevent this, it is preferable that a hologram be provided with not only rotationally symmetrical wavefront reproducibility but also free-form surface wavefront reproducibility.

The paragraph beginning at page 17, line 23, and ending at page 18, line 9:

Here, the second point light source B is so arranged as to substantially correspond to the position of an observer's pupil in the displayed image of the information display device. By arranging the second point light source B in this way, the optical path of light emitted from the second point light source B and that of light from the displayed image become substantially identical, and this makes it possible to make the diffraction efficiency utmost while the hologram lens is in [a] use. In addition, between the first point light source A and the photographic photosensitive material H, the manufacturing optical system Gr mentioned above is arranged which is composed of five lenses G1 to G5 that are decentered and combined together. This manufacturing optical system Gr is so [designed] designed that the wavefront of the light emitted from the first point light source A is so controlled that the displayed image is observed in a good condition.

The paragraph beginning at page 26, line 20, and ending at page 27 line 4:

In this embodiment, the concave reflecting surface is obliquely arranged relative to a light beam of the displayed image and has optical power as an eyepiece optical system, and therefore it forms a [nonaxisymmetric] nonaxisymmetric optical system. When this [nonaxisymmetric] nonaxisymmetric optical system performs only the same function as that of a centered lens, asymmetrical distortion (trapezoid distortion) caused by decentering or curvature of image surface [occur.] occurs. In order to prevent this, it is preferable that the concave reflecting surface be provided with not only rotationally symmetrical wavefront reproducibility but also free-form surface wavefront reproducibility. Therefore, such a concave reflecting surface is formed as an anamorphic aspheric surface and best suited for correcting decentering aberrations.

The paragraph beginning at page 33, line 15, and ending at page 33, line 21:

From the end of a [flame] frame 9, a [code] cord 10 extends and is connected to a not shown movable personal computer or a portable telephone so as to receive [an] image information therefrom. It is also possible to realize a wireless apparatus, if it is used in a close range. Because of the property of a hologram described earlier, it is possible to secure a high see-through function, and therefore this apparatus serves as an HMD (head mounted display) which is unlikely to cause a user to be fatigued and is wearable all the time. This is also best suited for an image display apparatus for use in a so-called wearable computer.

The paragraph beginning at page 34, line 14, and ending at page 34, line 20:

From the end of a [flame] frame 9, a [code] cord 10 extends and is connected to a not shown movable personal computer or a portable telephone so as to receive [an] image information therefrom. It is also possible to realize a wireless apparatus, if it is used in a close range. Because of the property of a hologram described earlier, it is possible to secure a high see-through function, and therefore this apparatus serves as an HMD (head mounted display) which is unlikely to cause a user to be fatigued and is wearable all the time. This is best suited for an image display apparatus for use in a so-called wearable computer.

The paragraph beginning at page 36, line 20, and ending at page 37, line 1:

As for a definition of the hologram surface, by defining the two light beams used for forming the hologram, the hologram surfaces are [univocally] unequivocally defined. The two light beams are defined [depend] depending on the positions of the light sources of the individual light beams and the light beams emitted from the individual light sources is either a focusing beam (VIA) or an emitting beam (REA). The coordinates of a first point light source (HV1) and a second point light source (HV2) are expressed as (HX1, HY1, HZ1) and (HX2, HY2, HZ2), respectively.

IN THE CLAIMS:

Claims 11 and 31 have been cancelled.

New claim 32 has been added.

1. (Once Amended) An information display device comprising:
an image display member which displays images; and
a prism having at least two reflecting surfaces arranged in facing each other, and a plane hologram surface formed of a reflection-type hologram, and at least one of the two reflecting surfaces arranged in facing each other is a light-beam-selective surface which selectively transmits or reflects light,

wherein an image light beam that corresponds to image information and that exits from the image display member is reflected between the two reflecting surfaces arranged in facing each other, and is diffractively reflected on the hologram surface, and then, after being transmitted through the light-beam-selective surface, is directed to an observer's pupil.

16. (Amended) An information display device as claimed in claim 13,
wherein the first image display member and the second image display member are connected to each [other] other.

28. (Amended) An optical element comprising:
two reflecting surfaces arranged in facing each other, and at least one of the two reflecting surfaces is a light-beam-selective surface that selectively transmits or reflects light; and
a plane hologram surface formed of a reflection-type hologram,
wherein light entering the optical element is reflected on the two reflecting surfaces, and after being reflected on the hologram surface is transmitted through the light-beam-selective surface and then exits therefrom.

Serial No. 09/801,405

29. (Amended) An optical element as claimed in claim 28,
wherein the [third reflecting] hologram surface has positive optical power.